CLAIMS

1. An apparatus for removal rate profile manipulation during a chemical mechanical planarization (CMP) process, comprising:

an actuator capable of vertical movement perpendicular to a polishing surface of a polishing pad, the actuator capable of flexing the polishing pad independently of a pad support device; and

an actuator control mechanism in communication with the actuator, the actuator control mechanism capable of controlling an amount of vertical movement of the actuator, wherein the actuator provides local flexing of the polishing pad to achieve a particular removal rate profile.

2. An apparatus as recited in claim 1, wherein the actuator is further capable of horizontal movement parallel to the polishing surface of the polishing pad.

3. An apparatus as recited in claim 2, wherein the actuator is a double roller.

4. An apparatus as recited in claim 3, wherein the double roller comprises a first roller above the polishing pad and a second roller below the polishing pad.

5. An apparatus as recited in claim 4, wherein the double roller is capable of flexing the polishing pad toward a wafer being planarized and away from the wafer being planarized.

6. An apparatus as recited in claim 2, wherein the actuator is a double slider.

7. An apparatus as recited in claim 3, wherein the double slider comprises a first slider above the polishing pad and a second slider below the polishing pad.

8. An apparatus as recited in claim 7, wherein the double slider is capable of flexing the polishing pad toward a wafer being planarized and away from the wafer being planarized.

9. An apparatus as recited in claim 7, wherein each slider projects a liquid toward the polishing pad to reduce friction.

10. An apparatus as recited in claim 7, wherein each slider projects a gas toward the polishing pad to reduce friction.

11. A method for manipulating a removal rate profile during a chemical mechanical planarization (CMP) process, comprising:

providing an actuator capable of vertical movement perpendicular to a polishing surface of a polishing pad, the actuator capable of flexing the polishing pad independently of a pad support device; and

altering a vertical position of the actuator relative to the polishing pad to locally flex the polishing pad to achieve a particular removal rate profile.

12. A method as recited in claim 11, further comprising the operation of altering a horizontal position of the actuator parallel to the polishing surface of the polishing pad to locally flex the polishing pad to achieve a particular removal rate profile.

13. A method as recited in claim 12, wherein the actuator is a double roller comprising a first roller above the polishing pad and a second roller below the polishing pad.

14. A method as recited in claim 12, wherein the actuator is a double slider comprising a first slider above the polishing pad and a second slider below the polishing pad.

15. A method as recited in claim 14, wherein each slider projects a liquid toward the polishing pad to reduce friction.

16. A method as recited in claim 14, wherein each slider projects a gas toward the polishing pad to reduce friction.

17. A system for removal rate profile manipulation during a chemical mechanical planarization (CMP) process, comprising:

a polishing pad capable of planarizing a wafer, wherein the polishing pad comprises a flexible material;

a pad support device disposed below the polishing pad, the pad support capable of providing reactive force to the wafer during a CMP process;

an actuator capable of vertical movement perpendicular to a polishing surface of the polishing pad and horizontal movement parallel to the polishing pad, the actuator capable of flexing the polishing pad independently of the pad support device; and

an actuator control mechanism in communication with the actuator, the actuator control mechanism capable of controlling an amount of vertical and horizontal movement of the actuator, wherein the actuator provides local flexing of the polishing pad to achieve a particular removal rate profile.

18. A system as recited in claim 17, wherein the actuator is a double roller comprising a first roller above the polishing pad and a second roller below the polishing pad.

19. A system as recited in claim 17, wherein the actuator is a double slider comprising a first slider above the polishing pad and a second slider below the polishing pad.

20. A system as recited in claim 19, wherein each slider projects a liquid toward the polishing pad to reduce friction.